

Water Management Plan

United States Environmental Protection Agency
Region 8 Laboratory
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8 LABORATORY

WATER MANAGEMENT PLAN

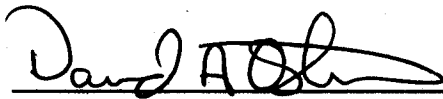
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14 October 2003

Date



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10/15/03

Date

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1.0 EPA'S STATEMENT OF PRINCIPLES ON EFFICIENT WATER USE

In order to meet the needs of existing and future populations and ensure that habitats and ecosystems are protected, the nation's water must be sustainable and renewable. Sound water resource management, which emphasizes careful, efficient use of water, is essential to achieve these objectives.

Efficient water use can have major environmental, public health, and economic benefits by helping to improve water quality, maintain aquatic ecosystems, and protect drinking water resources. As we face increasing risks to ecosystems and their biological integrity, the inextricable link between water quality and water quantity becomes more important. Water efficiency is one way of addressing water quality and quantity goals. The efficient use of water can also prevent pollution by reducing wastewater flows, recycling process water, reclaiming wastewater, and using less energy.

EPA recognizes that regional, state, and local differences exist regarding water quality, quantity, and use. Differences in climate, geography, and local requirements influence the water efficiency programs applicable to specific facilities. Therefore, EPA is establishing facility specific Water Management Plans to promote the efficient use of water and meet the water conservation requirements under Executive Order 13123, Greening the Government Through Efficient Energy Management.

This Water Management Plan has been established to document and promote the efficient use of water at the U.S. EPA Region 8 Laboratory in Golden, Colorado. The plan is organized according to the Federal Energy Management Program (FEMP) Facility Water Management Planning Guidelines under Executive Order 13123.

2.0 FACILITY DESCRIPTION

The Region 8 Laboratory located in Golden, Colorado was dedicated in 1998. Laboratory staff perform physical, chemical, biological, and microbiological analyses of samples of water, soil, air, plants, and animals. The data generated by these studies is used in the Regional Environmental Monitoring and Assessment Program (REMAP), enforcement projects, and remediation projects. Many of these projects are undertaken to ensure successful restoration of contaminated ecosystems.

The 47,800 square-foot laboratory occupies a one-story building. The building is laid out with a main corridor that runs the length of the building, from front to rear, and four parallel wing corridors projecting from the main corridor. Offices, laboratories, storage areas, and mechanical rooms are located on both sides of the corridors. The central utility plant is located at the rear of building, at the end of the main corridor. A utility chase is located above the ceiling along the length of each of the corridors.

The building is leased by the U.S. General Services Administration (GSA) from REIT Management, Inc., and is assigned to EPA by GSA. The building lease runs through 2018. EPA is responsible for all water, sewer, and other utility bills.

3.0 FACILITY WATER MANAGEMENT GOALS

The water management goals of the Region 8 Laboratory are achieved through the implementation of the Laboratory Environmental Management System (EMS). The EMS has been established and is implemented consistent with the laboratory environmental management policy. The Region 8 environmental management policy statement is provided below.

Environmental Management Policy

PREAMBLE: In Region 8, our operations, such as running a business office, operating a laboratory, traveling, commuting to work, purchasing and contracting, and communicating with others, result in hundreds of actions and decisions that affect the environment. Each day, opportunities are presented to improve our performance and lessen our environmental impacts.

At EPA Region 8 we commit to recognize and act upon these opportunities. Our Environmental Management System (EMS) will be designed to follow the guiding principles listed below. Our three year goal is to become a leader in sustainability within the six states that comprise Region 8.

EPA REGION 8'S GUIDING PRINCIPLES

We understand that all life depends upon the essential services provided by the Earth, such as capturing energy from the sun through photosynthesis, the natural purification of water and air, and pollination. However, as a society, we are systematically altering the basic ecological systems and functions that provide such important life-supporting services to us. In realizing this, EPA Region 8 employees commit to integrate environmental considerations into the way we operate our offices.

We will work toward sustainability by :

- * reducing our dependence on materials extracted from the Earth - such as oil, coal, uranium, and metals that are limited in supply - and moving toward operations based on renewable energy and materials.
- * reducing purchases, use and releases of man-made toxic substances.
- * reducing our use of energy and natural resources. We will take actions to protect the life-supporting services of the Earth - for example, fresh water and clean air.
- * ensuring that our decisions and actions protect all communities and people, regardless of location, income or race.

We will share our successes and lessons learned, hoping through dialogue to improve our own performance and that of others. EPA Region 8 managers will lead by example and encourage all employees to build these four commitments into how we do our jobs. We will ask: "Does this decision meet our Guiding Principles?"

Our slogan is: Employees Managing for Sustainability...all systems green.

4.0 UTILITY INFORMATION

Contact Information

Potable water supply and sewer service is provided by:

North Table Mountain Water and Sanitation District
4806 W. 52nd Avenue
Golden, CO 80403-1228

(303) 279-2854

Rate Schedule

The water billing rate is a tiered system:

Amount	Rate per 1000 Gallons
0 - 15,000 gallons	\$1.80
15,000 - 60,000 gallons	\$1.99
60,000 - 150,000 gallons	\$2.15
150,000 - 300,000 gallons	\$2.18
300,000 - 1,500,000 gallons	\$2.38
More than 1,500,000 gallons	\$2.57

A 4% discount is given if payment is received within 10 days.

The fire protection fee is \$12 per month.

Building water supply and irrigation water are metered and billed separately.

The sewer billing rate is 1.3 times the water billing rate. This charge applies only to the building water supply, not the irrigation water line.

Payment Office

Gerald Billings
Mail Code 2734-R
U.S. EPA
1200 Pennsylvania Avenue, NW
Washington, DC 20460
(202) 564-4841

5.0 FACILITY INFORMATION

The Region 8 Laboratory achieves water conservation through modern facility and process design and through application of sound management systems, work practices, and operation and maintenance procedures. Water is used for landscape irrigation, mechanical systems, sanitary needs, and laboratory processes. Additional details on facility water use are provided in the following sections.

Major Water Using Processes

Estimates of water consumption by major use area are provided in Table 1. These data reflect average facility water use between September 2000 and August 2002.

Table 1
Major Water Using Processes

Major Process	Annual Consumption (gallons)	Percent of Total	Comments
Landscape irrigation	2,432,000	54.4	Metered
Cooling tower make-up	408,000	9.1	Engineering estimate
Fish culture water	876,000	19.6	Engineering estimate
Reverse osmosis reject water	385,000	8.6	Engineering estimate
Miscellaneous laboratory uses	294,500	6.7	By difference
Sanitary	73,000	1.6	Engineering estimate
TOTAL	4,468,500	100.0	Metered

Because irrigation water use and cooling tower water consumption occurs primary between April and September, water use varies seasonally. Charts showing trends in water use, based on monthly records from September 2000 to August 2002, are provided in Appendix A.

Measurement Devices

Incoming city water for building supply and irrigation are metered separately. Flow totals from each meter are recorded monthly.

Shut-off Valves

The main city water shut-off valves are located in the chiller room.

Occupancy and Operating Schedules

Approximately 35 employees work at the Region 8 Laboratory. The Laboratory operates on a flex time schedule and is typically occupied between 6:30 a.m. and 6:00 p.m., Monday through Friday.

6.0 BEST MANAGEMENT PRACTICE SUMMARY AND STATUS

The Federal Energy Management Program (FEMP) has identified Water Efficiency Improvement Best Management Practices (BMPs) in ten possible areas. Implementation of BMPs in four or more areas are required under FEMP guidance. The Region 8 Laboratory has adopted and will maintain BMPs in 6 of the ten areas checked below:

- Public Information and Education Programs
- Distribution System Audits, Leak Detection and Repair
- Water Efficient Landscape
- Toilets and Urinals
- Faucets and Showerheads
- Boiler/Steam Systems
- Single-Pass Cooling Systems
- Cooling Tower Systems
- Miscellaneous High Water-Using Processes
- Water Reuse and Recycling

Public Information and Education Programs (BMP #1)

EPA staff awareness of water conservation is maintained through discussion at monthly staff meetings, and employees are actively involved in day-to-day conservation issues. Water conservation posters are displayed to promote water conservation.

The on-site building engineer has been made aware that water and energy conservation are key operating principles for the laboratory. These practices are integrated into building system operation and maintenance practices wherever practical.

Distribution System Audits, Leak Detection and Repair (BMP #2)

All facility water consumption is accounted for. Water supply piping to laboratory spaces is on overhead racks in service corridors. Any leaks are immediately reported to the facilities manager and building engineer and corrected. The facilities manager and building engineer perform a monthly building inspection to identify any maintenance issues that need to be addressed. Any problems identified are corrected immediately.

Water Efficient Landscape

The area surrounding the laboratory building consists of approximately 150,000 square feet of irrigated turf, interspersed with single coniferous and deciduous trees. Because of long-term, regional drought conditions, significant attention is focused on minimizing irrigation water use. Working together, the building owner and EPA facilities manager monitor water use restrictions imposed by the North Table Mountain Water and Sanitation District and ensure that landscape irrigation is compliant with those restrictions.

The irrigation schedule is established by the landscape contractor, under the supervision of the property manager, Commercial Asset Management. The current direction to the contractor is to minimize irrigation in each of the 30 zones, maintaining it at a minimum level to avoid stress in irrigated vegetation.

The irrigation system is monitored for effectiveness, and problems are identified by a daily walk-around visual inspection of outside property by the building engineer. Any problems identified are immediately brought to the attention of the landscape contractor for correction.

Due to current imposed irrigation restrictions by the North Table Mountain Water and Sanitation District, stress could not be avoided during the 2002 irrigation season. Irrigation water use between September 2001 and August 2002 was 2,179,000 gallons, which is equivalent to 14.4 gallons per square foot. Further irrigation water reduction would require the implementation of xeriscape landscape design. The Region 8 Laboratory plans to investigate the feasibility and cost effectiveness of converting part or all of the irrigated landscape to xeriscape design. While best operation and maintenance practices have been implemented, the Region 8 Laboratory is not claiming BMP credit for water efficient landscape, pending the evaluation of xeriscape design.

Toilets and Urinals (BMP #3)

Low-flow fixtures are used throughout the facility. Janitorial staff and employees are trained to report leaks or other maintenance problems to the building engineer, which are immediately corrected. An inventory of sanitary fixtures is provided in Table 2.

Table 2
Sanitary Fixture Inventory

Fixture	Quantity	Flow Rate
Toilets	10	1.6 gpf
Urinals	2	1 gpf
Lavatory Sinks	8	2.0 gpm
Showers	2	2.5 gpm
	2	2.0 gpm

Faucets and Showerheads (BMP #4)

Low-flow fixtures are used throughout the facility. Janitorial staff and employees are trained to report leaks or other maintenance problems to the building engineer, which are immediately corrected. An inventory of sanitary fixtures is provided in Table 2. System pressure is maintained at 60 psi, within the range recommend for optimum system performance.

Boiler/Steam Systems (BMP #5)

Boilers produce recirculating hot water, rather than steam. No steam condensate is generated.

Single Pass Cooling Equipment (BMP #6)

No single pass cooling is used. The building systems and laboratory processes have been designed so that all cooling needs are supplied by a central recirculating chilled water loop.

Cooling Tower Systems

Cooling tower system performance is monitored and maintained regularly by the building engineer. A conductivity meter is used to automatically control cooling tower blow down; the conductivity meter is regularly maintained by the building engineer. The blow down controller is set to achieve approximately four cycles of concentration within the cooling tower. Chemical treatment is provided to control scale and corrosion.

Because of some mechanical design problems in the condenser water loop, condenser water flow to each cooling tower cell is below the manufacturer's minimum recommended design flow during most operating conditions. This leads to improper wetting of the tower media, air blow-by, and excessive water carry over from the tower. An engineering study of this situation has been prepared and forwarded to the building owner for review.

Miscellaneous High Water-Using Processes

The primary use of process water within the laboratory is culture water for raising *pimephales promelas* (fathead minnow), *ceriodaphnia dubia* (daphnid), and other freshwater organisms for use in water quality toxicity testing. A synthetic culture water is prepared by mixing reverse osmosis (RO) permeate with appropriate minerals. The culture water is supplied to the culture tanks on a flow through basis at approximately 90 to 100 gallons per hour and then discharged to sewer. For every eight gallons of RO permeate generated, approximated three gallons of reject water is generated and discharged to sewer.

An upgraded culture water supply system is currently being designed. As presently envisioned, the new culture water feed system would be supplied with dechlorinated tap water rather than RO water, which will significantly reduce the amount of RO reject water generated and discharged to sewer.

Water Reuse and Recycling

An opportunity may exist to reuse RO system reject water as make-up water to the cooling tower system. Currently, approximately 32,000 gallons/month of RO reject water is estimated to be generated, which could significantly off-set cooling tower make-up water demand during the cooling season. Before such a project is pursued, RO system reject water generation rates will be monitored after the upgraded culture water project is implemented. As currently envisioned, the upgraded culture water system will significantly reduce RO water use, which may make RO reject water reuse less economical and practical.

7.0 DROUGHT CONTINGENCY PLAN

The Region 8 Laboratory will follow the water use recommendations and restrictions of the North Table Mountain Water and Sanitation District.

As a matter of general operating practice, the laboratory already follows most of the water conservation approaches that are recommended or could be required under drought conditions. Water is not used for decorative fountains, maintenance of paved surfaces, or washing of mobile equipment. Landscape irrigation is constrained to comply with any water use restrictions in force.

When voluntary or mandatory water use restrictions are instituted by North Table Mountain Water and Sanitation District, the requirements are communicated by the Water District to the building owner. In turn, the owner's representative communicates the requirements to the Facilities Manager. The Facilities Manager assembles a task force of facility and operating personnel to identify and implement modifications to facility operations to achieve additional specified reductions in water consumption.

8.0 COMPREHENSIVE PLANNING

The Facilities Manager will ensure that water supply, wastewater generation, and water efficiency BMPs are taken into account during the initial stages of planning and design for any facility renovations or new construction. These factors will also be considered prior to the purchase and installation of any equipment that would measurably change facility water consumption.

9.0 OPPORTUNITIES FOR FURTHER WATER CONSERVATION

The Region 8 Laboratory is considering several projects to achieve additional reductions in water use, listed below:

1) Cooling Tower Flow Metering. EPA recommends that the building owner arrange for the installation and routine monitoring of flow meters on the cooling tower make-up water and blow down discharge lines. Data obtained from these meters will provide a more accurate accounting of the flow balance around the cooling tower and ultimately better cooling tower control.

2) RO System Flow Metering. EPA recommends that the building owner arrange for the installation and routine monitoring of flow meters on the RO system supply, permeate, and reject water lines. Data obtained from these meters will provide a more accurate accounting of the flow balance around the RO system, and ultimately better system control. These flow data also will provide sufficient information to fully evaluate reuse options for RO system reject water.

3) Culture Water Conservation. The possibility of reducing the culture water flow rate will be examined. The culture water flow rate will be measured monthly and controlled to minimize water use while maintaining the necessary and proper environment for cultured species.

4) Culture Water Reuse and Recycle. As part of the detailed design effort to upgrade the culture water supply system, culture water reuse and recycle options should be identified and evaluated for feasibility and cost effectiveness.

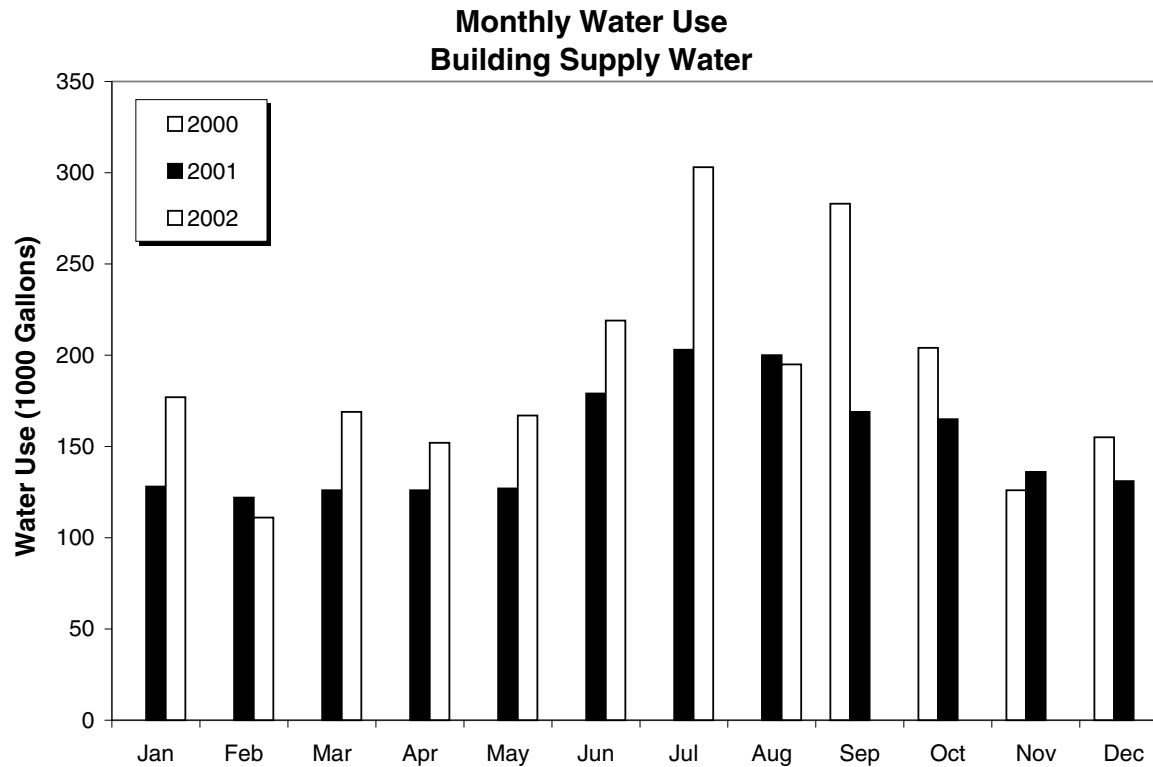
5) Xeriscaping. Working with the building owner, EPA will consider the potential to replace all or part of the currently irrigated turf with xeriscaping. As an initial step, a design concept consistent with the aesthetic covenants of the local industrial park should be developed and evaluated for feasibility and cost effectiveness.

APPENDIX A
MONTHLY WATER USE DATA

EPA Region 8 Laboratory, Golden, Colorado

**Monthly Building Supply Water Use (1000 Gallons)
September 2000 through August 2002**

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000									283	204	126	155
2001	128	122	126	126	127	179	203	200	169	165	136	131
2002	177	111	169	152	167	219	303	195				



EPA Region 8 Laboratory, Golden, Colorado

**Monthly Irrigation Water Use (1000 Gallons)
September 2000 through August 2002**

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000									286	267	0	0
2001	0	0	0	123	403	446	784	376	451	58	50	0
2002	0	0	0	154	415	432	256	363				

**Monthly Water Use
Irrigation Water**

